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Liocarcinus lancetidactylus (Smirnov, 1929) and
Platymaia lethaeus (Smirnov, 1929)
(Crustacea, Brachyura)
from the Lower Miocene of N Caucasus (Russia)

Riassunto – *Liocarcinus lancetidactylus* (Smirnov, 1929) e *Platymaia lethaeus* (Smirnov, 1929) (Crustacea, Brachyura) del Miocene inferiore del Caucaso settentrionale (Russia)

Viene descritto un campione di crostacei decapodi brachiuri, rinvenuti in sottili livelli di calcare grigio della Serie di Maikop (Regione di Apsheronok, N Caucaso - Russia), datata al Miocene inferiore. I crostacei brachiuri di questa Serie, oggetto di studio da parte di Smirnov (1929), sono stati attribuiti dall'autore a *Portunus* Weber, 1795, *Planes* Bowditch, 1825 (nom. sub pro *Nautilograpsus* H. Milne Edwards, 1837), *Macropodia* Leach, 1814 e *Inachus* Weber, 1795. Lo studio del nostro campione ha permesso in primo luogo di appurare che gli esemplari di *Macropodia* Leach, 1814 sono da ascrivere a *Inachus* Weber, 1795. Inoltre, questo lavoro di revisione ha permesso di stabilire, grazie all'osservazione di tipici caratteri morfologici, che gli esemplari di *Portunus* Weber, 1795 sono da ascrivere in realtà a *Liocarcinus* Leach, 1814 (famiglia Portunidae Rafinesque, 1815) e che gli esemplari di *Inachus* Weber, 1795 sono da ascrivere a *Platymaia* Miers, 1886 (famiglia Majidae Samouelle, 1819). Se *Liocarcinus* Leach, 1814 è già conosciuto negli strati miocenici dell'Ungheria, la scoperta di *Platymaia* Miers, 1886 risulta quanto mai interessante, in quanto trattasi della prima segnalazione di questo genere nel record fossile. L'attuale distribuzione delle specie viventi di *Liocarcinus* Leach, 1814 e *Platymaia* Miers, 1886 (mari caldi dell'Indo-Pacifico e dell'Atlantico occidentale) proverebbero lo stretto legame che dovrebbe esistere tra le faune del Miocene della Russia e dell'Ungheria e quelle dei mari tropicali attuali.

Parole chiave. Crostacei, Decapodi, Brachyura, Miocene, Russia.

Abstract – We describe a sample of brachyuran decapod crustaceans, discovered in thin levels of grey clays of Maikop Series (Apsheronok Region, N Caucasus - Russia), dated back to the Lower Miocene. The brachyurans of this Series, subject of a study by Smirnov (1929), were ascribed to *Planes* Bowditch, 1825 (nom. sub. pro *Nautilograpsus* H. Milne-Edwards, 1837), *Portunus* Weber, 1795, *Macropodia* Leach, 1814 and *Inachus* Weber, 1795. The study of our sample has permitted referring the specimens of *Macropodia* Leach, 1814 to *Inachus* Weber, 1795. Moreover, this review has allowed establishing, thanks to the observations of some typical morphological features, that the specimens belonging to *Portunus* Weber, 1795 are ascribed to *Liocarcinus* Leach, 1814 (family Portunidae Rafinesque, 1815). The specimens belonging to *Inachus* Weber, 1795 are referred to *Platymaia* Miers, 1886 (family Majidae Samouelle, 1819). *Liocarcinus* Leach, 1814 is already known from the Miocene layers of Hungary, the discovered of *Platymaia* Miers, 1886 is particularly interesting, since it is the first report of this genus in the fossil record. The present distribution of living species of *Liocarcinus* Leach, 1814 and *Platymaia* Miers, 1886 (warm sea of

Indo-Pacific and western Atlantic), would confirm the narrow connections that existed between the Miocene fauna of Russia and Hungary and those of present tropical warm seas.

Key words: Crustacea, Decapoda, Brachyura, Miocene, Russia.

Introduction

This work describes 19 specimens of brachyuran decapod crustaceans found during an excavation carried out in the nineties by Dr. A. Bannikov of the Palaeontological Museum of the Academy of Sciences of the USSR in the Apsheronk Region (N Caucasus, Russia), 1.5 km West of Shirvanskaya, near the Pshekha river. The specimens are preserved in the upper layers of the Maikop Series dated as Middle-Upper Oligocene and Lower Miocene (Nalivkin, 1973, pag. 621). The origin of this deposition assemblage is still debated. According to Nalivkin (1973), some consider the Maikop Series to be of deep-water origin, while others think that it consists of terrestrial deposits of near-shore alluvial plains located between rising mountain chains and sea.

The Maikop Series, with a thickness between 100 and 1400-1700 m, is generally subdivided into three parts. The lower part, located in the Maikop Region, consists of light grey clays containing ostracods, while the middle-upper parts of the Series, dated to the Lower Miocene, consists of dark grey clays occasionally preserving fishes and decapod crustaceans (Smirnov, 1929; Garassino & Teruzzi, 1996).

Previous study of brachyurans from the Lower Miocene of N Caucasus

The brachyurans of N Caucasus have already been the subject of study by Smirnov (1929) who described on a sample of almost 100 crabs four species: *Portunus lancetidactylus* Smirnov, 1929, *Portunus arcuatus* Leach, 1814, *Planes prior* Smirnov, 1929 (nom. sub. pro *Nautilograpsus* H. Milne-Edwards, 1837) and *Inachus lethaeus* Smirnov, 1929. Moreover, the author ascribed some specimens to *Macropodia* Leach, 1814 without specific ascription.

This review involved a comparison between Smirnov's sample and our specimens. Since, at present, Smirnov's sample has been lost (Bannikov, com. pers.), we decided, following the regulations of the Code of Zoological Nomenclature (International Commission on Zoological Nomenclature, 1999 – Article 75: neotypes), to re-describe the species already studied by Smirnov, establishing the neotypes.

Preservation styles and materials

The brachyuran decapod crustaceans, preserved in thin dark grey clayey levels, are flattened on the layers. Their preparation is made easy by the softness of the surrounding matrix.

The study sample, housed in the collections of the Palaeontological Museum of the Academy of Sciences of the USSR and Museo di Storia Naturale di Milano, is limited to 19 specimens, two of which are preserved as part and counterpart.

Ten specimens are ascribed to *Liocarcinus* Leach, 1814, *L. lancetidactylus* (Smirnov, 1929) (family Portunidae Rafinesque, 1815), and 9 specimens are ascribed to *Platymaia* Miers, 1886, *P. lethaeus* (Smirnov, 1929) (family Majidae Samouelle, 1819).

Acronyms. MSNM: Museo di Storia Naturale di Milano; PIN: Palaeontological Museum of Academy of Sciences

Systematics

Superfamily Portunoidea Rafinesque, 1815

Family Portunidae Rafinesque, 1815

Genus *Liocarcinus* Leach, 1814

Liocarcinus lancetidactylus (Smirnov, 1929)

Figs. 1, 3, 4, 5

1929 – *Portunus lancetidactylus* - Smirnov, Figs. 1-7.

The perfect state of preservation of our sample has permitted observing some typical features that our and Smirnov's specimens are to be ascribed to *Liocarcinus* Leach, 1814 instead of *Portunus* Weber, 1795. For this reason, we re-describe this species giving its main morphological features.

Diagnosis: subhexagonal carapace with a characteristic T shaped protuberance on the cardiac region; three teeth on the frontal margin; three teeth on the antero-lateral margins; a single strong tooth on the inner margin of the carpus of pereopod I.

Neotype: PIN 4504-6.

Type locality: Apsheronk Region (N Caucasus, Russia).

Geological age: Lower Miocene.

Material: 10 complete specimens in good state of preservation of which three are preserved as part and counterpart; 6 specimens are in dorsal view and 4 in ventral view.

MSNM: i13526, i13527, i13528, i22863, i22864, i22865, i22866.

PIN: 4504-6, 4504-7, 4504-8.

Description. Medium-sized brachyuran, with thin finely granulate carapace and 0.7 to 2.5 cm in length.

Carapace. The carapace, in dorsal view in some specimens, is subhexagonal in shape, slightly wider than long. Three well developed teeth are present on the frontal margin. The antero-lateral margins have three strong teeth in the upper part, while the medium and lower parts are smooth. The ocular incisions are narrow and shallow. On the surface of the carapace a characteristic T shaped protuberance is visible on the cardiac region. The surface is finely granulate

Abdomen. The somites are triangular in shape and narrow towards somite VI.

Cephalic appendages. The cephalic appendages are badly preserved in all specimens. It is possible to observe only the small eyes with a short eye-stalk.

Thoracic appendages. In one specimen in ventral view (MSNM i13526) the short and hook-shaped mandibles are visible. Pereiopod I is shorter than the others. The chelae are short and stout with smooth inner and outer margins, without teeth along dactylus and index. The carpus has a strong tooth on the inner margin. Pereiopods II-IV are the same length, with a terminal dactylus. They are longer than pereiopod V with paddle-like terminal dactylus.

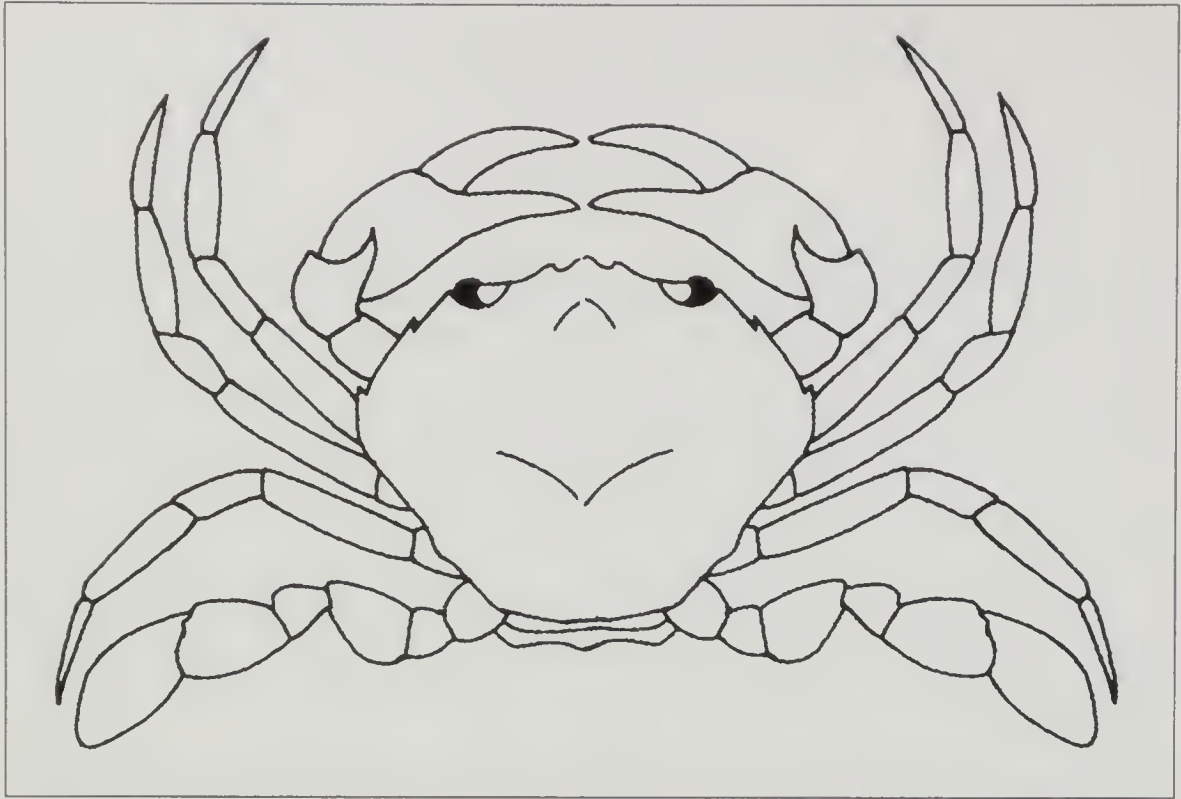


Fig. 1 – *Liocarcinus lancetidactylus* (Smirnov, 1929), reconstruction, line drawing.

Observations

Smirnov (1929) ascribed about 100 specimens of the Maikop Series to *Portunus* Weber, 1795 on the basis of morphological features, such as the carapace being wider than long, frontal margin with 3 to 6 teeth, antero-lateral margins with 9 teeth and pereiopod I with dentate merus. The author recognized two species, *P. lancetidactylus* Smirnov, 1929 and *P. arcuatus* Leach, 1814 (synonymous with the living species *Liocarcinus arcuatus* (Leach, 1814); cfr. Falciai & Minervini, 1992), belonging to this latter genus.

On the basis of Smirnov's iconographical material, it seems to us that there are no morphological differences between *P. lancetidactylus* Smirnov, 1929 and *P. arcuatus* Leach, 1814, since the specimens belonging to the two species show the same morphological features, such as the subhexagonal carapace and three teeth both on the frontal and antero-lateral margins.

Moreover, since Smirnov's specimens ascribed to *P. arcuatus* Leach, 1814 show the frontal margin of the carapace with three distinct teeth, surely they don't belong to the species *P. lancetidactylus* Smirnov, 1929.

We wish to point out that Smirnov (1929) ascribed some specimens of his collection to *Planes* Bowditch, 1825 as *P. prior* Smirnov, 1929. The specimens look like those belonging to *Portunus* Weber, 1795, but since their state of preservation is bad it was very difficult to observe their main morphological features. For this reason we are not able to evaluate them.

The study of our specimens revealed some morphological features, such as the subhexagonal carapace, three teeth both on the frontal and antero-lateral margins and one strong spine on the inner margin of carpus of pereiopod I, that are also present in Smirnov's specimens belonging to *P. lancetidactylus* Smirnov, 1929.

These features are typical of *Liocarcinus* Leach, 1814, and not of *Portunus* Weber, 1795 (Falciai & Minervini, 1992).

This is the second report of this genus in the fossil record, since *Liocarcinus* Leach, 1814 is already known in the Middle Miocene (Badenian) of Hungary with *L. rakosensis* (Lörenthey & Beurlen, 1929), *L. oroszyi* (Bachmayer, 1953), and *L. kuehni* (Bachmayer, 1953) (Müller, 1984).

Superfamily Oxyrhyncha Latreille, 1802

Family Majidae Samouelle, 1819

Genus *Platymaia* Miers, 1886

Platymaia lethaeus (Smirnov, 1929)

Fig. 2, 6, 7, 8

1929 – *Inachus lethaeus* – Smirnov, Figs. 27-32.

The perfect state of preservation of our sample has revealed some typical features that confirmed that our and Smirnov's samples are to be ascribed to *Platymaia* Miers, 1886, instead of *Inachus* Weber, 1795. For this reason, we re-describe this species giving its main morphological features.

Diagnosis: subovoidal carapace with a well developed branchial region; short rostrum with one small tooth on the base of the lateral margins; pereopod I shorter than the others; pereopods II-V with the same length.

Neotype: PIN 4504-9.

Type locality: Apsheronsk Region (N Caucasus, Russia).

Geological age: Lower Miocene.

Material: 9 complete specimens, of which one is preserved as part and counterpart, in a fairly good state of preservation.

MSNM: i13529, i13530, i13531, i13532, i13533, i22860, i22861, i22862.

PIN: 4504-9.

Description. Small-sized brachyuran, with smooth carapace, 0.4 to 0.6 cm in length.

Carapace. The carapace, in dorsal view, is subovoidal in shape and narrows slightly anteriorly due to the weak curvature of the antero-lateral margins. The rostrum is short with one small tooth on the base of the lateral margins. The ocular incisions are narrow and shallow. The branchial region of the carapace is well developed. The antero-lateral margins are smooth. On the surface of the carapace there are no visible spines, tubercles or grooves.

Cephalic appendages. Poorly preserved in all specimens. It is possible to observe only the eyes with a short eye-stalk.

Thoracic appendages. Pereopod I is shorter than the others with short and thin chelae. Pereopods II-V are thin, with very elongate merus of equal length.

Observations

Smirnov (1929) ascribed 20 specimens to *Macropodia* Leach, 1814 without further specific designation and to *Inachus lethaeus* Smirnov, 1929.

On the basis of Smirnov's iconographic material, we observed that there are no morphological differences between the specimens of *Macropodia* Leach,

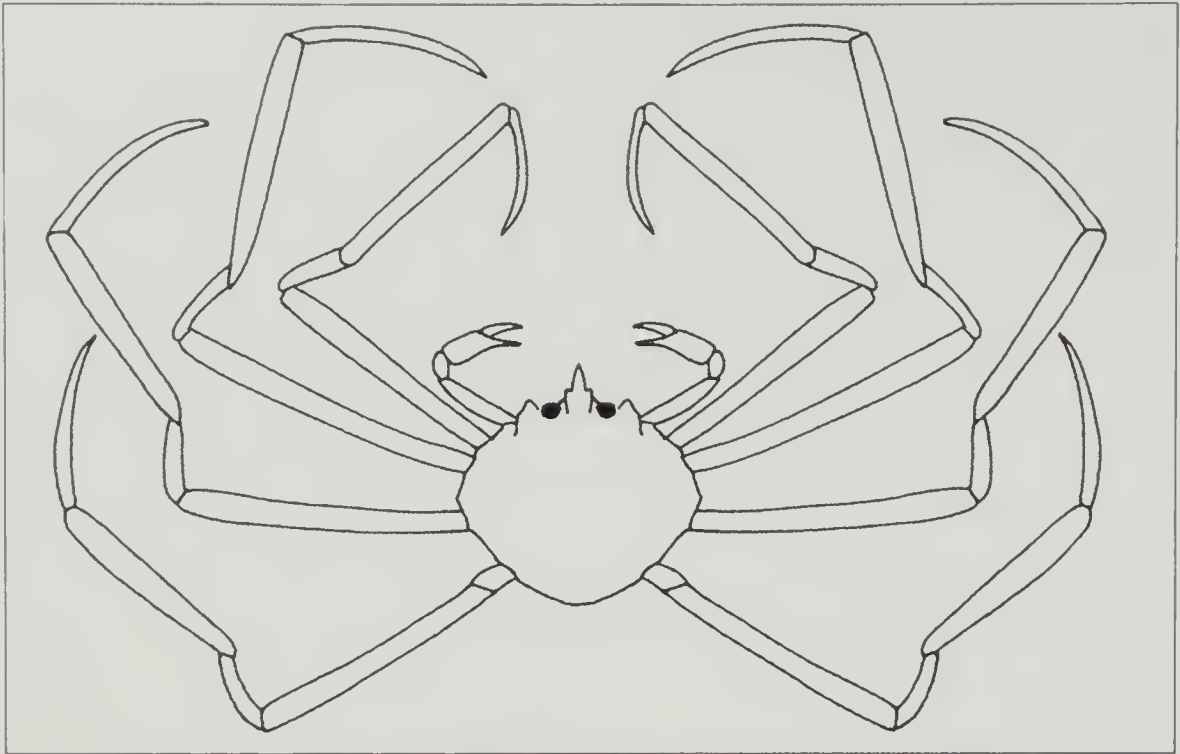


Fig. 2 – *Platymaia lethaeus* (Smirnov, 1929), reconstruction, line drawing.

1814 and those of *Inachus* Weber, 1795. In fact, all specimens show the subovoidal carapace, short rostrum, pereiopod I shorter than the others and pereiopod II-V of the same length. These common morphological features should permit referring Smirnov's specimens to *Inachus* Weber, 1795, on the basis of the regulations of Code of Zoological Nomenclature.

However, as mentioned above, Smirnov's specimens have pereiopods II-V of equal length; this feature is also observable in our specimens. We deny that our and Smirnov's specimens are referable to *Inachus* Weber, 1795 since Falciai & Minervini (1992) and Zariquiey Alvarez (1968) pointed out that in this genus pereiopod II is longer than the others.

The subovoidal carapace with well developed branchial regions, the short rostrum with one small tooth on the base of lateral margins, pereiopod I shorter than the others and with thin and short chelae and the pereiopods II-V of the same length, are typical morphological features of the living genus *Platymaia* Miers, 1886 (Guinot & Richer de Forges, 1985). We justify this placement because, among the fossil and the living genera belonging to the family Majidae Samouelle, 1819 only *Platymaia* Miers, 1886 has a typical subovoidal carapace (Glaessner, 1969; Guinot & Richer de Forges, 1985; Falciai & Minervini, 1992).

The presence of *Platymaia* Miers, 1886 in the Lower Miocene of N Caucasus is very important because it is the first report of this genus in the fossil record. Moreover, its presence should confirm the deep water origin of the Maikop Series, since this genus is an abyssal benthonic form.

Conclusions

The decapod crustacean assemblage of the Lower Miocene of N Caucasus is largely brachyurans; the macrurans are rarer. The good state of preservation of

these specimens is probably connected to the fine grained nature of the sediment (a marly limestone) and to the probable habits of these decapods to live in hollow depressions.

The specimens exhibit an ornamentation with spines and tubercles that we can explain as structures compatible with living in hollow depressions. Moreover, many brachyuran species have a preference for the muddy seabed in which they find camouflage opportunities or the possibility to excavate in burrows.

Platymaia Miers, 1886, known to date only by living species, shows, with this new information, more distant origins.

The present distribution of living species of *Liocarcinus* Leach, 1814, and *Platymaia* Miers, 1886, (warm sea of Indo-Pacific and western Atlantic), would confirm the narrow connections that existed among the Miocene fauna of Russia (N Caucasus) and Hungary and those of the present tropical warm seas.

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Fig. 3 – *Liocarcinus lancetidactylus* (Smirnov, 1929), neotype, n. cat. PIN 4504-6, photo and reconstruction (x2).

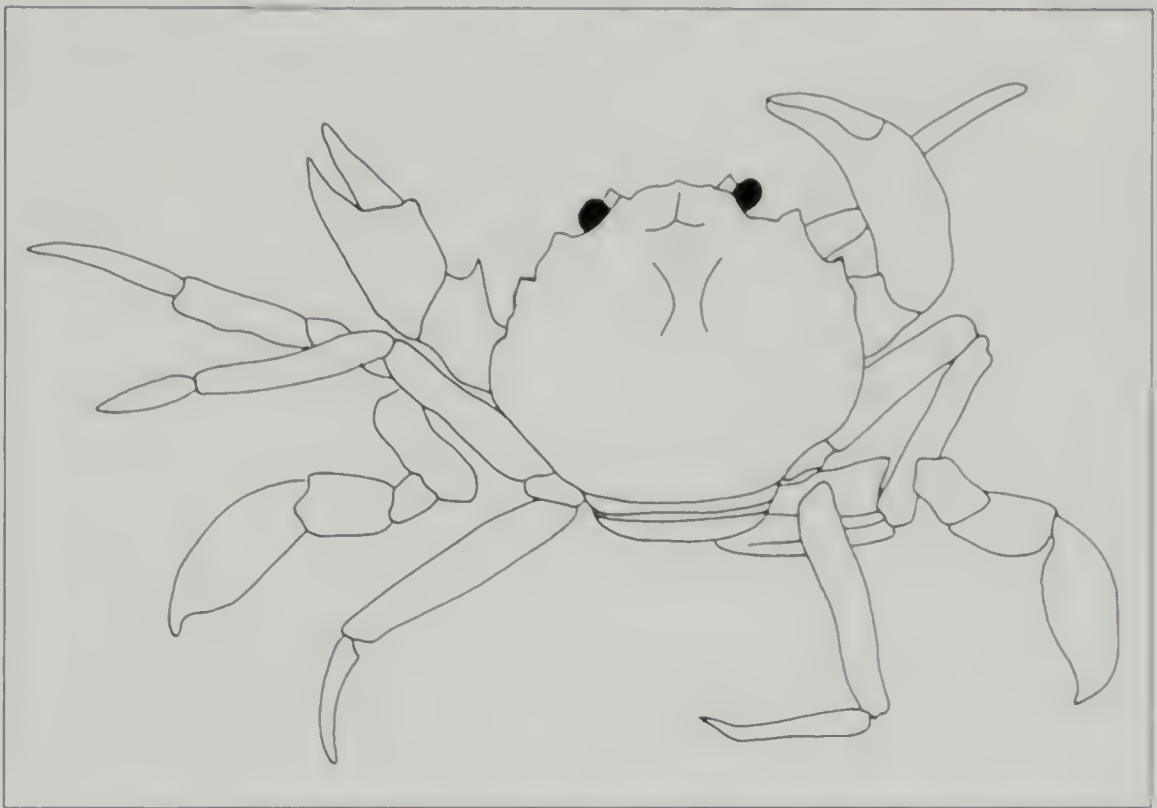


Fig. 4 – *Liocarcinus lancetidaetylus* (Svirnov, 1929), n. cat. MSNM i22863, photo and reconstruction (x1.3).

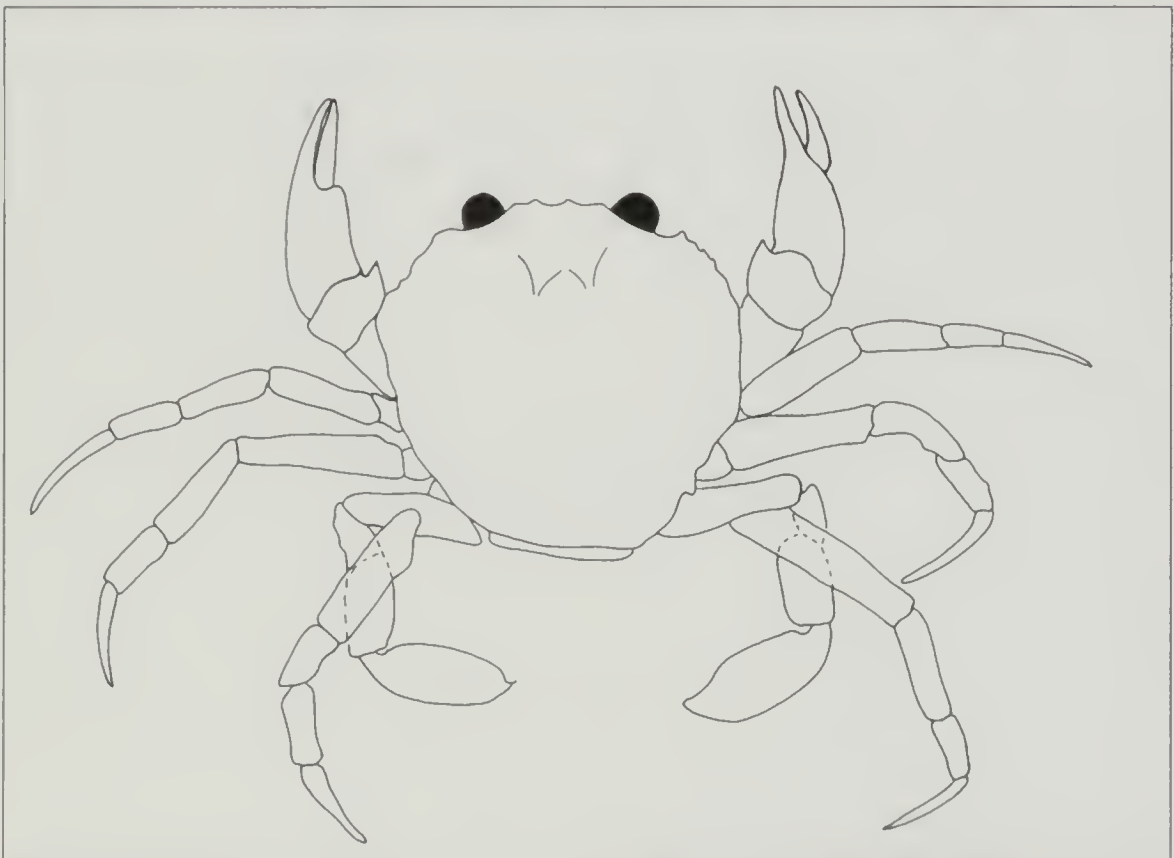


Fig. 5 - *Liocarcinus lancetidactylus* (Smirnov, 1929), n. cat. MSNM i22864, photo and reconstruction (x2).



Fig. 6 - *Platymaia lethaeus* (Smirnov, 1929), neotype, n. cat. PIN 4504-9, photo and reconstruction (x4).

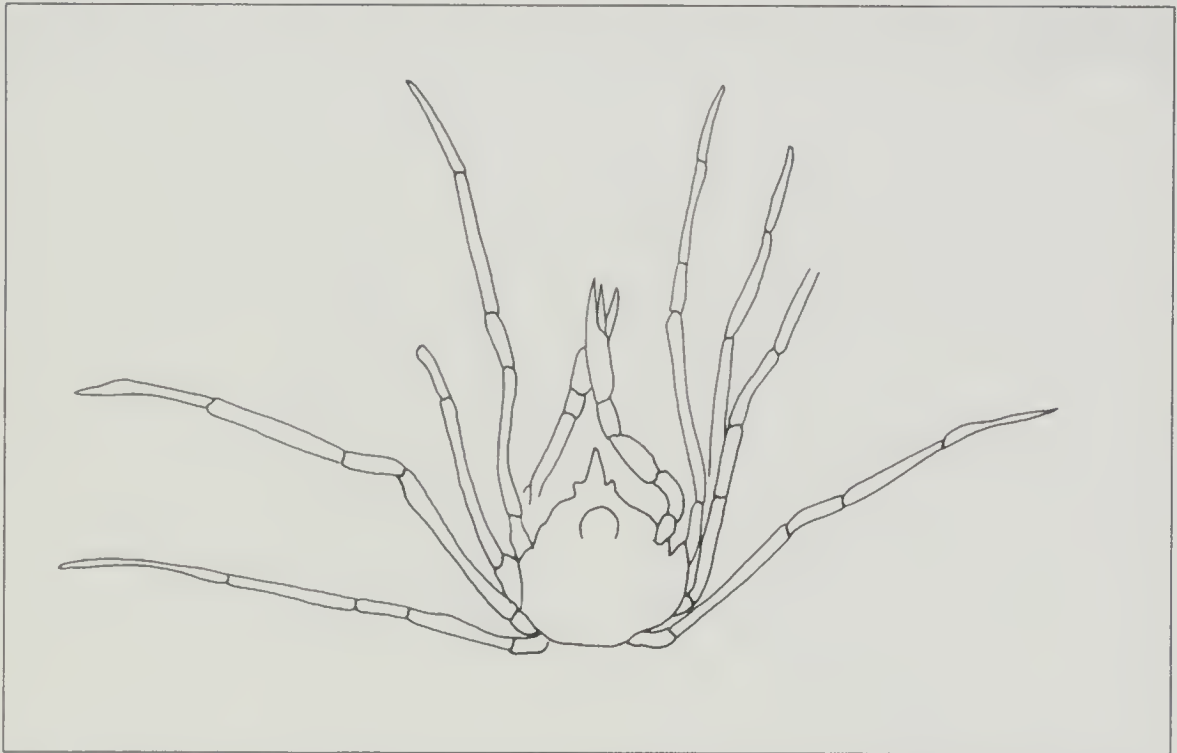


Fig. 7 – *Platymaia lethaeus* (Smirnov, 1929), n. cat. MSNM i13531, photo and reconstruction (x4).

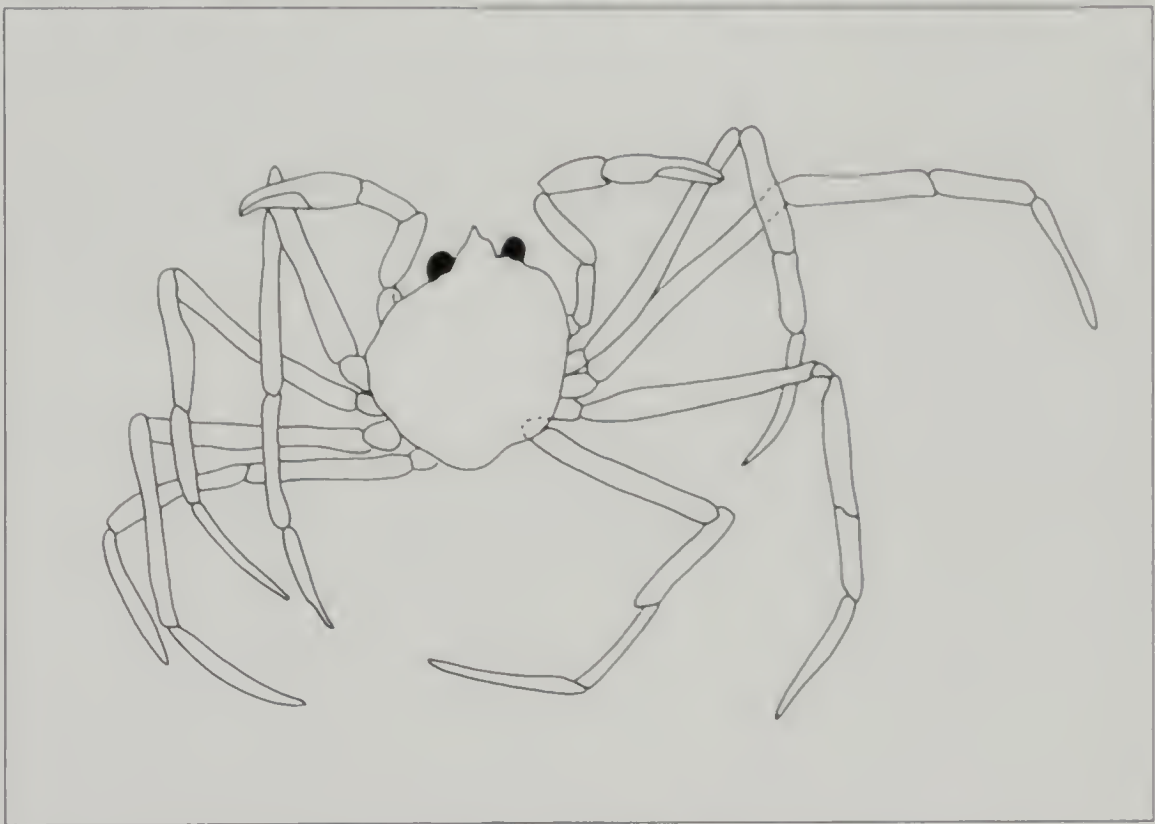
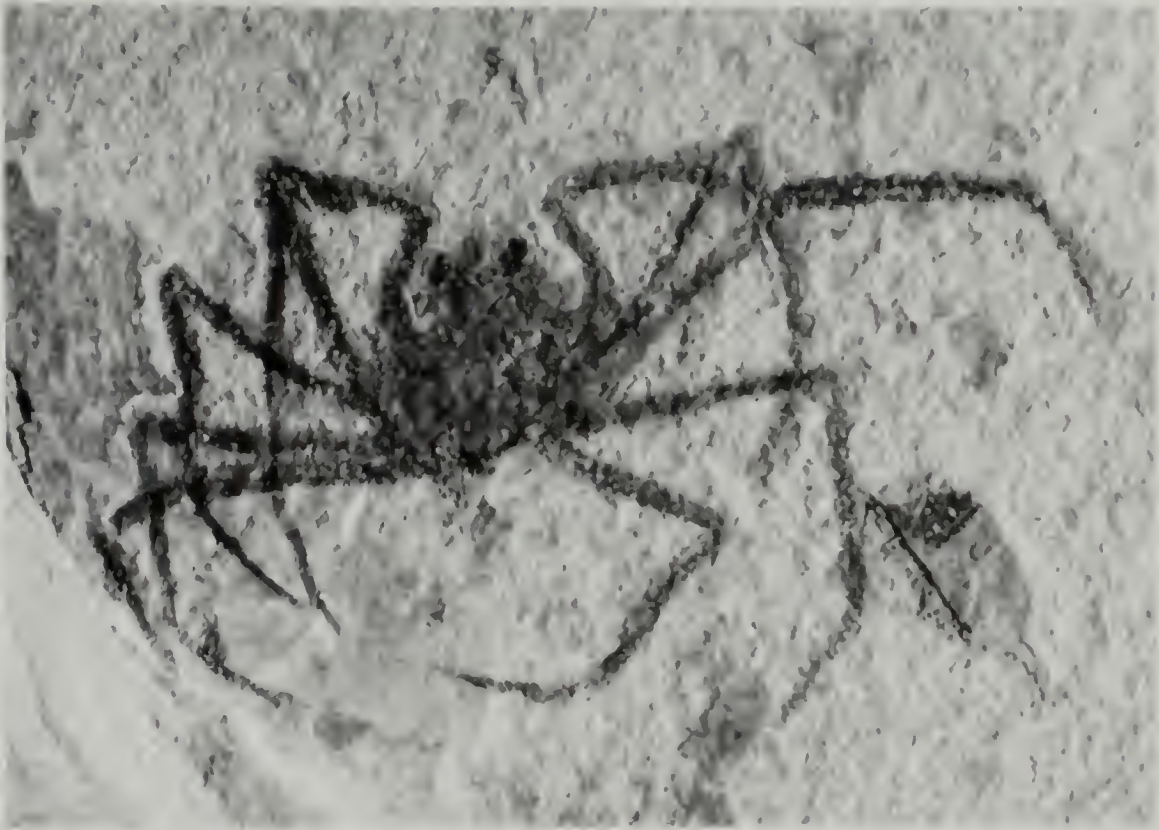


Fig. 8 – *Platymaia lethaeus* (Smirnov, 1929), n. cat. MSNM i22860. photo and reconstruction (x4).